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10/584,263	12/28/2006	Michitsugu Mori	292877US2PCT	5680

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EXAMINER	
DUNLAP, JONATHAN M	

ART UNIT	PAPER NUMBER
2855	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/584,263	MORI ET AL.	
	Examiner	Art Unit	
	Jonathan Dunlap	2855	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 June 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/20/2006,6/26/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Applicant is reminded of the proper content of an abstract of the disclosure.

A patent abstract is a concise statement of the technical disclosure of the patent and should include that which is new in the art to which the invention pertains. If the patent is of a basic nature, the entire technical disclosure may be new in the art, and the abstract should be directed to the entire disclosure. If the patent is in the nature of an improvement in an old apparatus, process, product, or composition, the abstract should include the technical disclosure of the improvement. In certain patents, particularly those for compounds and compositions, wherein the process for making and/or the use thereof are not obvious, the abstract should set forth a process for making and/or use thereof. If the new technical disclosure involves modifications or alternatives, the abstract should mention by way of example the preferred modification or alternative.

The abstract should not refer to purported merits or speculative applications of the invention and should not compare the invention with the prior art.

Where applicable, the abstract should include the following:
(1) if a machine or apparatus, its organization and operation;
(2) if an article, its method of making;
(3) if a chemical compound, its identity and use;
(4) if a mixture, its ingredients;
(5) if a process, the steps.

Extensive mechanical and design details of apparatus should not be given.

The following guidelines illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

2. The disclosure is objected to because of the following informalities:

3. Page 15, lines 2 should read "LX>Vk x Tt."

4. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Appropriate correction is required.

Claim Objections

5. Claim 3 is objected to because of the following informalities: "of the wedge" should be rewritten as --in the wedge--.

6. Claim 5 is objected to because of the following informalities: "half-wave length of incident ultrasonic wave" should be rewritten as --half-wave length of the incident ultrasonic wave--.

7. Claim 7 is objected to because of the following informalities: "calculated by multiplying velocity with which ultrasonic penetrates" should be rewritten as --calculated by multiplying the velocity with which the ultrasonic wave penetrates--.

8. Appropriate correction is required.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. **Claims 1 and 5** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Soltz** (**U.S. Patent 4,397,194**) in view of **Takada et al.** (**JP 2001-329654**) and **Takeda et al.** (**NPL - Flow Mapping of Mercury Flow**).

Considering claim 1, Soltz discloses an ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, comprising:

- an ultrasonic transmitter **11,12** for launching ultrasonic pulses of a prescribed frequency into the fluid to be measured in fluid pipe **10** from an

ultrasonic transducer **11,12** along a measurement line (**Figure 2; Column 5, lines 8-42**);

- wherein the ultrasonic transmitter and a receiver for receiving ultrasonic echoes are made to be an ultrasonic transducer integrating a transmitting function and a receiving function of the ultrasonic wave (**Figure 2; Column 5, lines 8-42**); and

- wherein a wedge **16** for fixing said ultrasonic transmitter **11,12** to the outer surface of the fluid pipe **10** for the fluid to be measured is provided (**Column 5, lines 8-42**).

The invention by Soltz fails to discloses:

- a flow velocity distribution measurement means for measuring flow velocity distribution of the fluid to be measured in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured; and

- a flow rate operation means for calculating a flow rate of the fluid to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured.

11. However, Takada teaches

- a flow velocity distribution measurement means **16** for measuring flow velocity distribution of the fluid **12** to be measured in a measurement region by receiving ultrasonic echoes reflected from the measurement

region among the ultrasonic pulses incident into the fluid to be measured (**[0016]; [0034]**); and

- a flow rate operation means **17** for calculating a flow rate of the fluid **12** to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured (**[0016]; [0034]**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a flow velocity distribution measurement means and a flow rate operation means as taught by Takada in the invention by Soltz. The motivation for doing so is that the Doppler ultrasonic flowmeter that uses a technique of instantaneous flow velocity profiling has been found to present high accuracy and responsiveness in measuring the flow rates of fluids (**[0016]**)

The invention by Soltz, as modified by Takada, fails to disclose that the distance from said ultrasonic transmitter to the outer surface of the fluid pipe and the distance from the outer surface of the fluid pipe to the inner surface of the fluid pipe through which the ultrasonic wave passes are formed to be an integral multiple of a half-wave length of ultrasonic wave incident into the fluid to be measured.

12. However, Takeda teaches that the distance between the transmitter and the wedge, as well as the wall thickness should be integral multiples of the half-wave length of the frequency incident to the fluid (**Page 162, Equation 2**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a wedge thickness and a wall thickness of an integral multiple of a half-wave length of the incident frequency as taught by Takeda in

the invention by Soltz, as modified by Takada. That motivation for doing so is found in the teachings of Takeda, in that the maximum transmission efficiency occurs at integral multiples of the half-wave length (**Page 162, Equation 2**).

Considering claim 5, Soltz discloses a wedge for an ultrasonic flowmeter for measuring a flow rate of a fluid to be measured, the flowmeter comprising:

- an ultrasonic transmitter **11,12** for launching ultrasonic pulses of a predetermined frequency into the fluid to be measured in fluid pipe **10** from an ultrasonic transducer **11,12** along a measurement line (**Figure 2; Column 5, lines 8-42**);
- wherein the ultrasonic transmitter and a receiver for receiving ultrasonic echoes are integrated and made to be an ultrasonic transducer integrating a transmitting function and a receiving function of the ultrasonic wave (**Figure 2; Column 5, lines 8-42**); and
    - wherein said wedge comprises: a fixation unit to fix said ultrasonic transducer to a fluid pipe relating to a fluid to be measured and that the transmitter is fixed to the fixation unit (**Column 5, lines 13-16**).

The invention by Soltz fails to discloses:

- a flow velocity distribution measurement means for measuring flow velocity distribution of the fluid to be measured in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured; and

- a flow rate operation means for calculating a flow rate of the fluid to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured,

13. However, Takada teaches

- a flow velocity distribution measurement means **16** for measuring flow velocity distribution of the fluid **12** to be measured in a measurement region by receiving ultrasonic echoes reflected from the measurement region among the ultrasonic pulses incident into the fluid to be measured (**[0016]; [0034]**); and

- a flow rate operation means **17** for calculating a flow rate of the fluid **12** to be measured in the measurement region based on the flow velocity distribution of the fluid to be measured (**[0016]; [0034]**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a flow velocity distribution measurement means and a flow rate operation means as taught by Takada in the invention by Soltz. The motivation for doing so is that the Doppler ultrasonic flowmeter that uses a technique of instantaneous flow velocity profiling has been found to present high accuracy and responsiveness in measuring the flow rates of fluids (**[0016]**).

The invention by Soltz, as modified by Takada, fails to disclose that the distance from said ultrasonic transmitter to the outer surface of the fluid pipe and the distance from the outer surface of the fluid pipe to the inner surface of the fluid pipe through

which the ultrasonic wave passes are formed to be an integral multiple of a half-wave length of ultrasonic wave incident into the fluid to be measured.

14. However, Takeda teaches that the distance between the transmitter and the wedge, as well as the wall thickness should be integral multiples of the half-wave length of the frequency incident to the fluid (**Page 162, Equation 2**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a wedge thickness and a wall thickness of an integral multiple of a half-wave length of the incident frequency as taught by Takeda in the invention by Soltz, as modified by Takada. That motivation for doing so is found in the teachings of Takeda, in that the maximum transmission efficiency occurs at integral multiples of the half-wave length (**Page 162, Equation 2**).

15. **Claims 2-4 and 6-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Soltz** (**U.S. Patent 4,397,194**) in view of **Takada et al.** (**JP 2001-329654**) and **Takeda et al.** (**NPL - Flow Mapping of Mercury Flow**) as applied to claim 1 above, and further in view of **Huang** (**PG-PUB 2002/0011120**).

Considering claim 2, the invention by Soltz, as modified by Takada and Takeda, fails to disclose explicitly that the wedge contact surface is fitted to equal the curvature of the fluid pipe.

16. However, Huang teaches that the wedge contact surface is equal to the curvature of the fluid pipe (**[0046]**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a contact surface of equal curvature to that of the fluid pipe as taught by Huang. The motivation for doing so is found in the teachings of Huang, "an angled wedge with a contact face fitted to the pipe curvature [allows] efficient energy transmission along the axial direction of the pipe" (**[0046]**).

Considering claim 3, Soltz teaches that a distance from the ultrasonic transmitter to the outer surface of the fluid pipe of the wedge is made longer than the distance obtained from multiplying the velocity of the ultrasonic penetrating through the wedge by the time of dead zone the ultrasonic oscillator carries (**The Examiner takes the position that if the distance is not longer then the dead zone distance, the transmitter will not be capable of detecting fluid flow at directly opposite the pipe wall. The dead zone distance is the time of dead zone multiplied by the velocity of the propagating wave. The distance must be long enough to allow the transmitter to detect a pulse, as required by the definition of dead zone; the amount of distance before which an ultrasonic transducer is incapable of detecting an object.**).

Considering claim 4, Soltz discloses that the material of the wedge from the ultrasonic transmitter and receiver to the outer surface of the fluid pipe is made of stainless steel (**Column 1, lines 40-57**).

The invention by Soltz fails to disclose what the pipe is made of.

The invention by Soltz, as modified by Takada, teaches that the pipe can be made of various types of steel (**[0064]; [0066]**).

17. However, Takeda teaches that the acoustic impedance match is a factor in the determination for the effeciency of the transmission of an ultrasonic wave into pipe. (**Page 161-162; Equation 2. The Examiner interprets equation 2 to show that the maximum transmission occurs at integral multiples of half-wave length regardless of the acoustic impedance relationship. However, the minimum transmission is dependant upon the relationship in the acoustic impedances. The equation shows the as the impedances approach one another the minimum efficiency approaches that of the maximum. The use of a stainless steel wedge and a steel pipe would therefore approach a minimum efficiency that is comparable to the maximum efficiency**).

Considering claim 6, the invention by Soltz, as modified by Takada and Takeda, fails to disclose explicitly that the wedge contact surface is fitted to equal the curvature of the fluid pipe.

18. However, Huang teaches that the wedge contact surface is equal to the curvature of the fluid pipe (**[0046]**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a contact surface of equal curvature to that of the fluid pipe as taught by Huang. The motivation for doing so is found in the teachings of Huang, "an angled wedge with a contact face fitted to the pipe curvature [allows] efficient energy transmission along the axial direction of the pipe" (**[0046]**).

Considering claim 7, Soltz teaches that the wedge comprises:

- a fixation unit for fixing said ultrasonic transmitter to the fluid pipe relating to the fluid to be measured (**Column 5, lines 13-16**); and

- an ultrasonic transmitting unit from the ultrasonic transmitter fixed to the fixation unit to the outer surface of the fluid pipe, wherein the distance from the ultrasonic transmitter in the ultrasonic transmitting unit to the outer surface of the fluid pipe is made longer than the distance calculated by multiplying velocity with which ultrasonic penetrates through the wedge and the time of dead zone the oscillator of ultrasonic wave carries (**The Examiner takes the position that if the distance is not longer then the dead zone distance, the transmitter will not be capable of detecting fluid flow at directly opposite the pipe wall. The dead zone distance is the time of dead zone multiplied by the velocity of the propagating wave. The distance must be long enough to allow the transmitter to detect a pulse, as required by the definition of dead zone; the amount of distance before which an ultrasonic transducer is incapable of detecting an object.**).

Considering claim 8, Soltz discloses that the material of the wedge from the ultrasonic transmitter and receiver to the outer surface of the fluid pipe is made of stainless steel (**Column 1, lines 40-57**).

The invention by Soltz fails to disclose what the pipe is made of.

The invention by Soltz, as modified by Takada, teaches that the pipe can be made of various types of steel (**[0064]; [0066]**).

19. However, Takeda teaches that the acoustic impedance match is a factor in the determination for the effeciency of the transmission of an ultrasonic wave into pipe. (**Page 161-162; Equation 2. The Examiner interprets equation 2 to show that the maximum transmission occurs at integral multiples of half-wave length regardless of the acoustic impedance relationship. However, the minimum transmission is dependant upon the relationship in the acoustic impedances. The equation shows the as the impedances approach one another the minimum efficiency approaches that of the maximum. The use of a stainless steel wedge and a steel pipe would therefore approach a minimum efficiency that is comparable to the maximum efficiency**).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jonathan Dunlap whose telephone number is (571)270-1335. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Lefkowitz can be reached on (571) 272-2180. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edward Lefkowitz/

Supervisory Patent Examiner, Art Unit 2855

/J. D./
Examiner, Art Unit 2855
April 28, 2008